Mapping the Magnetic Structure of the Corona and Heliosphere*

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The coronal magnetic field defines the large-scale structure of the solar corona, the position of the heliospheric current sheet, and the regions of fast and slow solar wind. To understand how the Sun influences the structure of the inner heliophere, we must relate observations of the large-scale magnetic field at the photosphere (e. g., from the Wilcox Solar Observatory) to Ulysses observat ions. Source-surface models make direct use of observed photospheric magnetic fields, and provide predictions of the structure of the heliosphere. However, these models generally rely on current-free assumptions; the presence of strong latitudinal density gradients in the corona make this assumptions unrealistic. On the other hand, full magnetohydrodynamic (MHD) computations of the corona have been performed, but these have used idealized initial magnetic fields and do not relate directly to observations. In this paper, we present three-dimensional MHD simulations of the corona based on observed photospheric magnetic fields; specific cases related to the Ulysses encounter have been computed and will be shown. We will compare predictions from the MHD simulation, such as the position of the heliospheric current sheet, with source-surface model predictions and Ulysses observations.

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